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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/052,989 | 11/09/2001 | Han-Kun Hsieh | YUSO-131 | 1309 |

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Raymond Sun
12420 Woodhall Way
Tustin, CA 92782

EXAMINER

VU, DAVID

ART UNIT PAPER NUMBER

2818

DATE MAILED: 04/11/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/052,989

Applicant(s)

HSIEH ET AL.

Examiner

DAVID VU

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 November 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 November 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 1-3, 5-8 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lu et al., (US 6,358,836) in view of Lin (US 6,348,399).

In re claims 1-3, 5-8 and 10, Lu et al., in related text (Col. 2, Lines 5-64) and figures (Figs. 1A-1F), disclose a method of forming electroplated solder on an organic circuit board for making flip chip joints and board to board solder joints, comprising: providing an organic circuit board 12 (Col. 3, Lines 30-39) including a surface bearing electrical circuitry that includes at least one contact pad 14; a solder mask layer 24 that is placed on board surface 12 and patterned to expose pad 14; a thin metal layer (UBM) 28/30 that is deposited over board surface 12; a resist layer 34 with at least one opening located at pad 14 that is deposited over thin metal layer (UBM) 28/30; a solder material 40 (Col. 8, Lines 52-58) that is formed in opening by electroplating (Col. 5, Lines 53-56); resist layer and thin metal layer beneath resist layer being removed (Figs. 1E-1F)

Lu et al., disclose all claimed subject matter, but fails to expressly disclose the method of forming UBM layer.

Lin, in related text, (Col. 3, Lines 4-8 and 16-20) discloses a thin metal layer (UBM) is deposited by CVD, PVD or PECVD method. It would have been obvious to one with ordinary skill in the art at the time of the invention to modify the Lu et al., by the method as taught by Lin since it becomes possible that the manufacture of a model chip scale package can be relatively simplified and economical, yield highly reliable.

2. Claims 4 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lu et al., (US 6,358,836) in view of Lin (US 6,348,399) and further in view of Akram (US 5,903,058).

Lu et al., disclose all claimed subject matter, but fails to expressly disclose the thickness of the UBM layer.

Akram, in related text, (Col. 6, Lines 5-11) discloses the thickness of the UBM layer may be about 3000Å. However, given the substantial Lu et al., in view of Lin and in further view of Akram, it would have been obvious to one with ordinary skill in the art at the time of the invention to judiciously adjust and control the thickness of the UBM layer through routine experimentation and optimization to achieve optimum benefits (see MPEP 2144.05) and it would not yield any unexpected results.

3. Claims 11-14, 16-21 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lu et al., (US 6,358,836) in view of Lin (US 6,348,399) and further in view of Sheridan et al., (US 6,489,229).

In re claims 11-14, 16-21 and 23, Lu et al., in related text (Col. 2, Lines 5-64) and figures (Figs. 1A-1F), disclose a method of forming electroplated solder on an organic circuit board for

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making flip chip joints and board to board solder joints, comprising: providing an organic circuit board 12 (Col. 3, Lines 30-39) including a surface bearing electrical circuitry that includes at least one contact pad 14; a solder mask layer 24 that is placed on board surface 12 and patterned to expose pad 14; a thin metal layer (UBM) 28/30 that is deposited over board surface 12; a resist layer 34 with at least one opening located at pad 14 that is deposited over thin metal layer (UBM) 28/30; a solder material 40 (Col. 8, Lines 52-58) that is formed in opening by electroplating (Col. 5, Lines 53-56); resist layer and thin metal layer beneath resist layer being removed (Figs. 1E-1F)

Lu et al., disclose all claimed subject matter, but fails to expressly disclose the method of forming UBM layer.

Lin, in related text, (Col. 3, Lines 4-8 and 16-20) discloses a thin metal layer (UBM) is deposited by electroless plating. It would have been obvious to one with ordinary skill in the art at the time of the invention to modify the Lu et al., by the method as taught by Lin since it becomes possible that the manufacture of a model chip scale package can be relatively simplified and economical, yield highly reliable.

Lu et al., disclose all claimed subject matter, but fails to expressly disclose the noble metal, such as gold, etc., should be avoided to be used as a part of the UBM layer.

Sheridan et al., in related text, (Col. 2, Lines 7-9) disclose a method for eliminating the Au layer formed on top of a Cu layer in a UBM stack. It would have been obvious to one with ordinary skill in the art at the time of the invention to modify the Lu et al., by the method as taught by Lin and Sheridan et al., since it becomes possible that the manufacture of a model

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chip scale package can be relatively simplified and economical. (See Sheridan et al., Col. 1, Lines 40-50).

4. Claims 15 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lu et al., (US 6,358,836) in view of Lin (US 6,348,399) and further in view of Sheridan et al., (US 6,489,229) and Akram (US 5,903,058).

Lu et al., disclose all claimed subject matter, but fails to expressly disclose the thickness of the UBM layer.

Akram, in related text, (Col. 6, Lines 5-11) discloses the thickness of the UBM layer may be about 3000Å. However, given the substantial Lu et al., in view of Lin and in further view of Akram, it would have been obvious to one with ordinary skill in the art at the time of the invention to judiciously adjust and control the thickness of the UBM layer through routine experimentation and optimization to achieve optimum benefits (see MPEP 2144.05) and it would not yield any unexpected results.

Conclusion

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Vu whose telephone number is (703) 305-0391. The examiner can normally be reached on Monday-Friday from 8:00am to 5:00pm. If attempt to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms., can be reached on (703) 308-4910.

DV

David Vu.


HOAI HO
PRIMARY EXAMINER